# Correctors for BTeV Spools
# Update on Vendors and Infrastructure

***Some midstream assessments, and comments on local impact***

***jct***

# Corrector Plan Overview

## BNL approach

- Complete package – design, fabricate, test
- Direct wire deposit, three nested coils, multilayer; serpentine winding cancels end harmonics
- 100A design
- Active quench protection

## IHEP approach

- Complete package – design, fabricate, test
- Conventional cos ??design with ribbon cable
- 50A design
- Quench protection TDB

# C0-IR Correctors & MTF Infrastructure



## CAT approach

- Cooperative effort – Fermilab: some infrastructure & cold testing
- Design approach follows LHC spool correctors; cos ??ribbon cable
- Will design to 100A (consider 300A?)
- Quench protection TDB

## CERN-Fermilab-Local Vendor option

- Cooperative design with CERN; ribbon cable from CERN: fabrication at local vendor; detailed design & testing at Fermilab
- Conventional cos ? design with ribbon cable
- 100A current limit (assumed)
- Quench protection TBD

- Mid-stream assessment
  - BNL
    - Correctors for DESY
    - Correctors for Beijing
    - Everything is in place for production
    - Design issue is current range
    - Schedule does not appear to be a problem
    - Site visit positive – review of facilities, cost discussion
    - Cost is major issue
  - IHEP
    - Magnetic System of the Tevatron Electron Lens for Fermilab:
      - superconducting solenoid, six superconducting dipole correctors and four conventional magnets
    - Expertise and infrastructure exist
    - Site visit planned – review facilities; discuss schedule details
    - Schedule could be an issue; communication and coordination at a distance

# C0-IR Correctors & MTF Infrastructure



- CAT, India
  - Experience with small LHC correctors
  - Infrastructure lacking
    - Wants Fermilab to provide warm magnetic measurement system
    - Cold test system – dewar, power supply, DAQ & controls – needs to be developed
    - Ribbon making facility, winding machine, and other tooling needs to be developed
  - Much longer lead times estimated than in our schedule
  - Wants a cooperative development program with Fermilab; warm measurement system; requires additional MTF infrastructure
  - Site visit TBD
- CERN/Fermilab/Local vendor
  - Experienced team
  - Informal discussions (M. Karppinen)
  - Additional demands on TD staff
  - Additional MTF infrastructure needed

# Correctors – Test Impact

- Test requirements (if any) are vendor dependent
  - If BNL or IHEP, Protvino then no corrector testing at Fermilab
  - If CAT, India then Fermilab must provide measurement system to CAT, and perform cold magnetic measurements at Fermilab
  - If CERN/Fermilab/local vendor then Fermilab must perform all measurements – warm & cold harmonics and quench testing
- Assume cold measurements at Fermilab, then we need:
  - New test dewar (IB1 addition pit)
    - Top plate
    - Instrumentation tree
    - Power leads
    - etc.

# C0-IR Correctors & MTF Infrastructure



- New Data Acquisition System
  - Up to three nested coils, with 2-3 vtaps each
    ** strong desire to require a center-tap for protection:
    $dV = V_a - V_b$ 'bucked' quench voltage signal, where a & b are the two 'half-coils **
  - Lead taps (?)
  - Temperature, pressure, & liquid level transducers
  - VME crate(s), controller, processor, data logger, DMM, current source, switch box, etc.
- Quench Detection System
  - Part of corrector power supply system
    - » $dV = V_{tot} - I*R - L*dI/dt$
  - Corrector Power Supply System (existing)
  - Capable of powering 3 coils
  - Incorporates quench protection (w/ dump resistor ?)
- New warm finger for magnetic measurements

- Magnetic measurement system
  - New probe form (depends on corrector ID & length)
  - Vertical support system & drive shaft (modifications to existing system)
  - Use existing data acquisition system